# PROGRESS REPORTS

FROM

# EXPERIMENT STATIONS

SEASON 1952-53

## ANGLO-EGYPTIAN SUDAN

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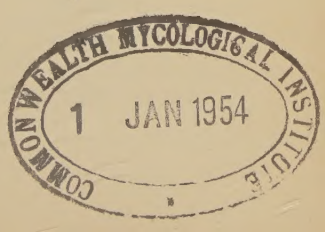

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# ANGLO-EGYPTIAN SUDAN

## COTTON BREEDING STATIONS
## PROGRESS REPORT FOR THE SEASON 1952-53

| | *Planting Dates.* | *Picking Dates.* |
|---|---|---|
| Gezira | Mid August to mid September. | January to March. |
| Gash | Late August to late September. | Mid January to April. |
| Tokar | Early September to mid October. | January to May. |
| Kordofan | Mid June to mid August. | Mid October to February. |
| Zeidab | First half May. | September to December. |
| Equatoria | Mid May to August. | October to mid February. |

INTRODUCTORY NOTE

BY

R. L. KNIGHT.

*Staff.*

At the beginning of the season K. C. Barlow left the Cotton Breeding Section to join the Sudan Ministry of Agriculture as an Inspector of Agriculture. He was replaced by A. Low, who arrived on 8th August 1952.

Dr. H. Douwes resigned at the end of last season and has taken a post with F.A.O. in Iran; he was replaced by Dr. S. O. S. Dark, formerly Hop Breeder at Wye College, who arrived on 9th October 1952.

In August 1952 the tragic death of J. Sadd occurred as a result of an air accident whilst he was returning from home leave. He was twenty-four.

*Commercial Cotton.*

Areas and yields are tabulated below:

| | *Area (feddans)* | *Yield (kantars)* |
|---|---|---|
| (i) *Egyptian cotton* | | |
| Gezira | 234,895 | 1,105,411 |
| White Nile | 63,166 | 232,020 |
| Gash | 72,100 | 104,775 |
| Tokar | 27,000 | 34,439 |
| | 397,161 | 1,476,645 |
| (ii) *American cotton* | | |
| Irrigated | 9,290 | 26,508 |
| Flood (Abu Habl) | 2,111 | 2,754 |
| Raingrown | 180,000 | 213,870 |
| | 191,401 | 243,132 |

1 feddan = 1·038 acres. 1 kantar = 315 rotls = 312 lb.

(i) *Egyptian Cotton.*

*The Gezira* (X1730A and Domains Sakel).—The Gezira crop was of average quantity but, for the second season in succession, grade was very poor. This low grade was largely due to an abnormally heavy infestation of the crop by whitefly (*Bemisia tabaci*).

*White Nile Schemes and Private Estates* (BAR 1730L.1 = XL.1).—Grade was very poor over most of the area but some estates produced cotton of excellent grade. Yields were variable, ranging from four kantars per feddan at Dueim to $7\frac{1}{4}$ at Wakra and 8 at Shabasha.

*The Gash* (X1730A, BAR1730L.1 and Domains Sakel).—Yields in the Gash were poor, largely as a result of Sudan bollworm attack. The X1730A area, 34,297 feddans, gave an average yield of only 1·1 kantars per feddan, whereas 3,126 feddans of BAR1730L.1 yielded at the rate of 2·5 kantars.

Sakel, which usually yields less than X1730A in the Gash, gave an average of 1·7 kantars this season.

*Tokar* (X1730A).—The Baraka flood was below average and only 27,000 feddans of cotton were grown.

(ii) *American Cotton.*

*Nuba Mountains.*—This season BAR SP84 was grown in the Western Jebels district and BAR 7/3 in the Eastern Jebels. Much of the crop suffered from a drought in June, which necessitated heavy resowing. This resulted in large areas being very late, and had the Nuba Mountains still been growing the old slow-maturing Pump Scheme Strain the crop would have been decimated. In spite of its lateness the crop was nearly as large as last season's record crop.

*Equatoria* (BAR SP84).—Much of the crop was late sown and the late rains were exceptionally heavy over considerable areas, producing vegetative growth but poor yields. Grade was poor. *Helopeltis, Dysdercus,* pink bollworm, Egyptian bollworm and American bollworm all contributed to this failure.

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## THE GEZIRA STATION

BY

M. F. ROSE, L. C. HUGHES AND A. LOW.

### Climate and Crop.

Excellent stands were obtained over all experimental areas but unfortunately the early promise of good yields was not fulfilled.

Pre-sowing rains were below average, but were heavier than those of the previous season. Thus rainfall from July 1st to August 15th* was 169·8 mm. compared with the record low of 48·7 mm. in 1951/52. Germination was good and growth strong and vigorous up to squaring and early flower formation, at which stage the crop just 'stuck'. No reason can be given for this sudden check in healthy development. There was a tendency for flowering to be late and from this stage onwards it was obvious that yields would be poor and grade poorer. Not only was the bottom crop lost but sympodia from the middle were shed, completely distorting the general habit of the plant. These symptoms were more marked in Sakel and Sakel derivatives than in the L types. Whitefly caused marked leaf shedding, the cotton responding with a heavy flowering flush on top of the plant: bolls developing were small and contained immature cotton. The heavy whitefly attack was followed by pink bollworm, which did much damage to both lint and seed, making laboratory analysis of breeding plot material most difficult. A root wilt, possibly *Rhizoctonia,* was present in the breeding plot but many plants just died with no apparent symptoms. This was ascribed to the impact of a vast whitefly population on an unhappy plant. The winter was one of the mildest on record and this would normally have been expected to produce good grade but for the overriding effect of the whitefly attack. Average yields for the Gezira Farm cotton acreage (180) were 788 lb. and 1354 lb. of seed cotton for Sakel and X1730A respectively. All picks were graded at 6.

Relevant meteorological data are given in Table 1, the 1951/52 figures being shown in brackets.

TABLE 1.

| | | *Mean Max.* °*F.* | *Mean Min.* °*F.* | *Total Rainfall* *mm.* | *Average Relative Humidity* *8 a.m.* |
|---|---|---|---|---|---|
| April | 1952 | 105 (104) | 69 (63) | — (—) | 16 (13) |
| May | ,, | 106 (105) | 75 (76) | 19·0 ( 14·0) | 32 (34) |
| June | ,, | 103 (104) | 77 (75) | 39·8 ( 11·8) | 47 (43) |
| July | ,, | 99 ( 99) | 74 (75) | 75·7 ( 29·7) | 62 (61) |
| August | ,, | 89 ( 95) | 71 (72) | 173·3 (125·1) | 82 (75) |
| September | ,, | 94 ( 95) | 70 (71) | 65·0 ( 37·4) | 74 (72) |
| October | ,, | 100 (101) | 69 (72) | 9·3 ( 18·0) | 52 (59) |
| November | ,, | 98 ( 97) | 63 (62) | 1·0 (—) | 35 (31) |
| December | ,, | 94 ( 86) | 59 (50) | — (—) | 37 (32) |
| January | 1953 | 96 ( 93) | 60 (58) | — (—) | 36 (44) |
| February | ,, | 98 ( 97) | 62 (60) | — (—) | 31 (27) |
| March | ,, | 102 (100) | 64 (63) | — (—) | 24 (11) |
| | | | Total = | 383·1 (236·0) | |

*The 'July-August effect'.

### Breeding.

*Egyptian (L Types).*

The breeding plot comprised 464 progeny rows of BAR 4/16 ($B_2$ $B_3$) deriving from high ovule parents, 68 progeny rows from BAR 4/16 – 664, a quality type selected by Anson, and 106 progeny rows of BAR 5/6, an X1730A type carrying $B_2$, $B_3$ and the red *arboreum* gene $R_2^{RS}$. Each progeny row had its appropriate parental control while X1730A as an overall control was planted at intervals of 20 rows down the angias. All types, including X1730A, showed bad opening and all boll weights were below average. It was obvious that fibre quality had been reduced to a common denominator by the season: in consequence attention was directed, in the final filter, to such characters as yield per plant, boll weight, effective seeds per loc, ginning outturn, and seed and lint index. From this welter of problematic material three groups emerged, noted as good, fairly good and average. The three groups, containing 31, 42 and 37 lots respectively and linked by common controls, will be tested by appropriate methods in the coming season. A parallel series of selfed seed will be held in reserve pending information from these trials.

*American Types.*

*BAR NT 96 'Cluster'.*—This cluster type for mechanical picking was again heavily rogued and all normal plants removed. 62 typical cluster plants were selfed and their seed was bulked and sent to Shambat for propagation and observation during the coming season. It would appear that this cluster character is determined by a weak major gene with a complex of minor modifiers. Again this type showed marked physiological shedding and the lint quality was poor.

*Stormaster.*—This small squat type, bred in the States for mechanical stripping and showing marked storm resistance, was rogued for off-types. These were few, and it was estimated that the final product would yield 85% of its crop in the first strip. Bolls retained their mature locs for periods of up to a fortnight.

With full scale mechanisation envisaged in the Central Rainlands, these two American types are of direct practical importance.

*Wilds SUS 16/1.*—In following the policy of acclimatizing Wilds SUS 16/1 to Gezira conditions, a quarter of an acre of this type was planted and heavily rogued for off-types, and 67 rows were selfed. This bulked seed was sent to Abu Guta for multiplication in the coming season.

In view of its past record in the Northern Province, the Gash and central Gezira, Wilds SUS 16/1 will probably play a much greater part in the general agricultural economy of the Sudan. Deriving from

the Zeidab Estates, it was selected here for earliness and yield and in terms of earliness has a very marked advantage over Domains Sakel, the earliest of the commercial types. (See "Testing"). It has a large 4-loculed boll opening well and giving lint of good grade. Although it has been shown to be fully susceptible to blackarm under controlled conditions of spraying (bacterial suspension) it seems to escape infection under central Gezira conditions. It is resistant to wilt (*Rhizoctonia*) and this fact has been noted not only in the Sudan but also in Aden, where Sakel types are susceptible. Its quality (length, strength and fineness) is slightly down on X1730A, but if this is accepted by the trade the future of this American irrigated type is assured.

*Special Problems.*

Work on the building up of salt tolerance in BLR 14/25 and on the transference of lint retention from *G. contextum* to BLR 14/25 was continued.

### Testing.

The standard variety trials were laid down in the North at Turabi, in the Centre at the Gezira Research Farm, and in the South at Hag Abdulla, with planting dates on 13th, 13th, and 16th August respectively. The layout was identical: randomized blocks of 9 varieties × 20 replications of plot size 0·01867 acre, with spacing 80 cms. × 35 cms. Yield figures are shown in Table 2.

The Southern trial was disappointing and suffered from thrips, whitefly and severe waterlogging throughout the season: waterlogging was the prime cause of reduced final yields. Blackarm was present in susceptible material but its severity was not so marked as local conditions would lead one to expect. All L types significantly outyielded (lint) all S types, with Wilds intermediate between the two groups. Wilds, however, did not look happy, and, like BAR NT 96 (American) of the previous year, did not respond favourably to the wetter conditions of the South.

Though blackarm was in evidence on the G.R.F. trial (Centre) the attack was light and had little effect on final yield. Whitefly attack was severe and Sakel types were markedly affected. Again the L group significantly outyielded the S group, with BLR 14/25 Gash just significantly better than Domains Sakel in its own group. The outstanding feature of the trial was the performance of Wilds SUS 16/1, which outyielded Domains Sakel by 56% (lint).

In the North the impact of pest and disease was much less than in the Centre and South. Blackarm was present but had little effect on final yields. Mean yields from the S and L groups were identical, with Wilds down on both but not significantly so. The performance

TABLE 2.

GEZIRA VARIETY TRIALS, 1952-53.

YIELDS OF SEED COTTON AND LINT IN POUNDS PER ACRE.

| *Variety* | *BAR Genes* | *Turabi (North)* | | | *G.R.F. (Centre)* | | | *Hag Abdulla (South)* | | | *Overall Mean* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Seed Cotton* | *Lint* | *G.O.T.* | *Seed Cotton* | *Lint* | *G.O.T.* | *Seed Cotton* | *Lint* | *G.O.T.* | *Seed Cotton* | *Lint* | *G.O.T* |
| S. GROUP | | | | | | | | | | | | | |
| Domains Sakel | | 1770 | 614 | 34·7 | 1338 | 447 | 33·4 | 621 | 200 | 32·2 | 1243 | 420 | 33·4 |
| BAR 14/25 Abu Guta | $B_1$ $B_2$ | 1686 | 583 | 34·6 | 1486 | 479 | 32·2 | 698 | 221 | 31·7 | 1290 | 428 | 33·2 |
| BLR 14/25 Gash | $B_1$ $B_2$ | 1702 | 587 | 34·5 | 1483 | 485 | 32·7 | 673 | 212 | 31·6 | 1286 | 428 | 32·9 |
| BLR 14/25.1 | $B_1$ $B_2$ | 1659 | 565 | 34·1 | 1470 | 473 | 32·2 | 688 | 217 | 31·6 | 1272 | 418 | 32·6 |
| L. GROUP | | | | | | | | | | | | | |
| X1730A | | 1599 | 611 | 38·2 | 1664 | 615 | 37·0 | 811 | 288 | 35·5 | 1358 | 505 | 36·9 |
| BAR XL—1 White Nile | $B_1$ | 1550 | 596 | 38·5 | 1680 | 617 | 36·7 | 889 | 311 | 35·0 | 1373 | 508 | 36·7 |
| BAR XL—1 Gash | $B_1$ | 1444 | 537 | 37·2 | 1726 | 623 | 36·1 | 920 | 317 | 34·5 | 1363 | 492 | 35·9 |
| BAR XL—3 | $B_1$ | 1610 | 600 | 37·3 | 1749 | 625 | 35·7 | 919 | 320 | 34·8 | 1426 | 515 | 35·9 |
| AMERICAN | | | | | | | | | | | | | |
| Wilds SUS 16/1 | | 1644 | 554 | 34·3 | 2081 | 698 | 33·5 | 806 | 278 | 34·5 | 1510 | 510 | 34·1 |
| Standard Error (Mean) | | | 16·8 | | | 13·8 | | | 7·7 | | | | |
| Difference P = 0·05 | | | 47 | | | 38 | | | 22 | | | | |
| Excluding Wilds SUS 16/1 Standard Error (Mean) | | | 16·4 | | | 13·3 | | | 7·7 | | | | |
| Difference P = 0·05 | | | 46 | | | 37 | | | 22 | | | | |

of BLR 14/25 and BLR 14/25.1 vis-a-vis Domains Sakel was disappointing. In terms of seed cotton this is a reversal of last season's figures. In spite of the effort to step up the ginning outturn of BLR 14/25, figures from all 3 trials indicate that the first filter BLR 14/25.1 has failed to achieve this end. Table 3 indicates the relative earliness of Wilds SUS 16/1 and the part it might play in a general water economy campaign in the Gezira. The centre lines of Table 3 indicate seed cotton picked up to and including the pick number shown in line 1, as a percentage of total seed cotton. Wilds is contrasted directly with Domains Sakel, the earliest commercial type grown in the Gezira.

TABLE 3.

RELATIVE EARLINESS OF WILDS SUS 16/1.

| | *Turabi* | *G.R.F.* | *Hag Abdulla* |
|---|---|---|---|
| No. of Pick (included) | 3rd | 4th | 3rd |
| Date | 15/1/33 | 15/1/53 | 17/1/53 |
| Wild SUS 16/1 | 83% | 89% | 93% |
| D.S. | 19% | 13% | 53% |
| Total Picks | 7 | 8 | 7 |
| Final Pick over Trial | 25/3/53 | 12/3/53 | 18/3/53 |

Table 4 summarizes the performance of current strains in the Gezira variety trials and Table 5 their spinning test behaviour.

MISCELLANEOUS TESTING.

(a) BAR 4/16 was tested against its first filter BAR 4/16.1 in a randomized block experiment of 14 replications. Final yield figures were as follows: —

| | Seed cotton per acre (lb.) | Lint per acre (lb.) | G.O.T. |
|---|---|---|---|
| BAR 4/16 | 1202 | 394 | 32·8 |
| BAR 4/16.1 | 1184 | 391 | 33·0 |

No advance has been made in yield increase and this filter will be finally dropped.

(b) Domains Sakel and BLJR 14/29 ($B_2$ $B_3$ $H_1$) were planted in 10 replications to provide spinning test samples. Spinning test data from BLJR 14/23 ($B_2$ $H_1$) have been most encouraging (see S.S.S.T. 282 in Shambat Report) and results from this successor type will be awaited with interest.

(c) A randomized block experiment, 4 strains × 10 replications, was planted at Tokar on September 30th, 1952. The strains were XAT.1, XAT, XAG and BAR 12/9, comparisons between the first three being of particular interest. XAT.1 was the bulked progeny of 200 plants selected by Knight in Tokar in January 1950. The original selection was based on plants with a good bottom crop

TABLE 4.

SUMMARY OF PERFORMANCE OF CURRENT STRAINS IN GEZIRA VARIETY TRIALS
UP TO AND INCLUDING SEASON 1952-53.

| Variety | Basic Type | Seed Cotton (lb./acre) No. of Trials | Seed Cotton (lb./acre) Mean Variety | Seed Cotton (lb./acre) Mean X1730A | Seed Cotton (lb./acre) Mean Dom. Sakel | Seed Cotton (lb./acre) Variety as % of X1730A | Seed Cotton (lb./acre) Variety as % of Dom. Sakel | Lint (lb./acre) No. of Trials | Lint (lb./acre) Mean Variety | Lint (lb./acre) Mean X1730A | Lint (lb./acre) Mean Dom. Sakel | Lint (lb./acre) Variety as % of X1730A | Lint (lb./acre) Variety as % of Dom. Sakel | Location |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Domains Sakel | S | 14 | 1328 | 1368 | 1328 | 97 | 100 | 14 | 428 | 480 | 423 | 89 | 100 | Northern Gezira |
| BLR 14/25 (Gash) | S | 3 | 1659 | 1587 | 1684 | 105 | 99 | 3 | 545 | 588 | 567 | 93 | 96 | Northern Gezira |
| BLR 14/25 (Abu Guta) | S | 1 | 1658 | 1597 | 1768 | 104 | 94 | 1 | 565 | 610 | 613 | 93 | 92 | Northern Gezira |
| X1730A | L | 14 | 1368 | 1368 | 1328 | 100 | 103 | 14 | 480 | 480 | 428 | 100 | 112 | Northern Gezira |
| BAR 1730L—1 (Gash) | L | 10 | 1346 | 1432 | 1431 | 94 | 94 | 10 | 482 | 516 | 469 | 93 | 103 | Northern Gezira |
| BAR 1730L—1 (White Nile) | L | 2 | 1548 | 1582 | 1642 | 98 | 94 | 1 | 558 | 576 | 544 | 97 | 102 | Northern Gezira |
| BAR 1730L—3 | L | 1 | 1644 | 1599 | 1770 | 103 | 93 | 1 | 554 | 611 | 614 | 91 | 90 | Northern Gezira |
| Wilds SUS 16/1 | | | | | | | | | | | | | | |
| Domains Sakel | S | 27 | 1576 | 1872 | 1576 | 84 | 100 | 27 | 499 | 660 | 499 | 76 | 100 | Central Gezira |
| BLR 14/25 (Gash) | S | 3 | 1320 | 1322 | 1022 | 100 | 129 | 3 | 424 | 487 | 343 | 87 | 124 | Central Gezira |
| BLR 14/25 (Abu Guta) | S | 1 | 1469 | 1663 | 1337 | 88 | 110 | 1 | 472 | 616 | 447 | 77 | 106 | Central Gezira |
| BLR 14/25.1 | S | 27 | 1872 | 1872 | 1576 | 100 | 119 | 27 | 660 | 660 | 499 | 100 | 132 | Central Gezira |
| X1730A | L | 11 | 1682 | 1565 | 1257 | 107 | 134 | 11 | 597 | 564 | 407 | 106 | 147 | Central Gezira |
| BAR 1730L—1 (Gash) | L | 2 | 1294 | 1153 | 864 | 112 | 150 | 2 | 461 | 422 | 291 | 109 | 158 | Central Gezira |
| BAR 1730L—1 (White Nile) | L | 1 | 2081 | 1664 | 1338 | 125 | 156 | 1 | 698 | 615 | 447 | 113 | 156 | Central Gezira |
| BAR 1730L—3 | L | 10 | 1272 | 1439 | 1272 | 88 | 100 | 10 | 408 | 511 | 408 | 80 | 100 | Southern Gezira |
| Wilds SUS 16/1 | | 3 | 767 | 756 | 531 | 101 | 144 | 3 | 235 | 267 | 169 | 88 | 139 | Southern Gezira |
| Domains Sakel | S | 1 | 687 | 810 | 621 | 85 | 111 | 1 | 217 | 288 | 200 | 75 | 109 | Southern Gezira |
| BLR 14/25 (Gash) | S | 10 | 1439 | 1439 | 1272 | 100 | 113 | 10 | 511 | 511 | 409 | 100 | 125 | Southern Gezira |
| BLR 14/25 (Abu Guta) | S | 10 | 1334 | 1197 | 963 | 111 | 138 | 10 | 467 | 422 | 313 | 111 | 149 | Southern Gezira |
| BLR 14/25.1 | S | 1 | 1029 | 731 | 487 | 141 | 211 | 2 | 351 | 256 | 153 | 137 | 229 | Southern Gezira |
| X1730A | L | 1 | 806 | 811 | 621 | 99 | 130 | 1 | 278 | 288 | 200 | 96 | 139 | Southern Gezira |
| BAR 1730L—1 (Gash) | L | | | | | | | | | | | | | |
| BAR 1730L—1 (White Nile) | L | | | | | | | | | | | | | |
| BAR 1730L—3 | L | | | | | | | | | | | | | |
| Wilds SUS 16/1 | | | | | | | | | | | | | | |

TABLE 5.

SUMMARY OF SPINNING TEST REPORTS ON CURRENT STRAINS IN GEZIRA VARIETY TESTS,
1942-43 TO 1951-52.

| Variety | Type | Effective Length 32's No. of Trials | Effective Length 32's Means Variety | Effective Length 32's Means Dom. Sakel | Standard Hair Weight No. of Trials | Standard Hair Weight Means Variety | Standard Hair Weight Means Dom. Sakel | Corrected Lea Strength Products No. of Trials | Means of 80's Counts Variety | Means of 80's Counts Dom. Sakel | No. of Trials | Means of 100's Counts Variety | Means of 100's Counts Dom. Sakel |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BLR 14/25 | S | 3 | 47·3 | 45·7 | 3 | 147 | 147 | 3 | 2547 | 2604 | 3 | 2246 | 2207 |
| BAR 1730L—1 | L | 17 | 46·9 | 46·3 | 17 | 161 | 161 | 25 | 2055 | 2053 | 16 | 1849 | 1853 |
| BAR 1730L—3 | L | 3 | 45·3 | 46·3 | 3 | 165 | 161 | 3 | 2220 | 2280 | 3 | 1860 | 1931 |

as opposed to the leggy, late types common to the commercial bulk of X1730A. XAT was from early picks of the commercial crop, presumably containing a high proportion of plants similar in habit to the original selections, while XAG was seed directly imported from the Gash and of Gezira origin.

Unfortunately, strains were bulked by replications, so that no analysis of variance was possible. However, the yield of XAT.1 and XAT exceeded that of XAG by 12% and 6% respectively. These findings fall in line with Knight's postulate that the commercial Gezira crop contains two distinct genotypes, one resistant to shade conditions. This evidence has further backing from field observations and from the results of 'shade' experiments carried out by the Chief Agronomist at Wad Medani. As a consequence to these findings XAT.1 and XAT will be bulked up continuously in the Tokar area, ultimately to replace the seed of the Gezira-Gash-Tokar cycle.

### Miscellaneous.

*Vicinism.*

In the 1951/52 season an angia, 14 metres × 75 metres, of BAR 5/6 (X1730A. $B_2$ $B_3$ $R_2^{RS}$) was planted between two angias of Domains Sakel and BAR XL.1 (X1730A. $B_2$), the latter being on the windward side. Picks were taken along the 75 metre sides of the enclosing angias at varying distances from the edge rows of BAR 5/6. In the present season, seed from the separate treatments was planted out and in October counts were made of the red seedlings in each treatment. Approximately 24,000 seedlings were examined in each lot. The percentage of outcrossing is shown in Table 6.

Table 6.

Outcrossing Experiment.

| *Type* | *Distance (metres) from BAR 5/6* | *% outcrossing* |
|---|---|---|
| BAR XL 1 | 1·80 | 0·25 |
| ,, | 7·25 | 0·24 |
| ,, | 13·05 | 0·19 |
| ,, | 27·8 | 0·28 |
| D.S. | 2·9 | 1·36 |
| D.S. | 8·8 | 0·38 |
| D.S. | 14·3 | 0·20 |

These figures are unaccountably low. Balls records outcrossing under field conditions in Egypt as from 5-10%, while Shambat figures have shown an outcrossing rate of up to 30%. Whether effective pollinating agents have disappeared from the fields as a result of

spraying the commercial crop with insecticides or whether insects generally play a very small rôle in cross-pollination is a matter of conjecture.

### Propagation. (Mohammed Eff. Taha El Faki).

The following propagation and nucleus rogued areas were grown throughout the Sudan.

(a) Blue Nile Province:—BAR 10/3 and BAR 7/8.1 at Jebel Tozi: 15 and 30 acres respectively.
BLR 14/25.1, BLJR 14/29 and BAR 4/16 at Abu Guta:
8, ½ and 1½ acres respectively.

(b) Kassala Province:— BAR XL.1 and BLR 14/25 at Kassala and Tendelai:
5 acres of each as nucleus rogued area.

(c) Tokar:— XAT and XAT.1: 80 acres and 1 acre respectively: general propagation.

(d) Northern Province:— Wilds SUS 16/1 at Aliab: 250 acres with 10 feddan nucleus rogued area in centre.

(e) Kordofan Province:— BAR 7/8.1 at Semeiha: 240 acres for large-scale propagation.

(f) Equatoria Province:—BAR 11/5 at Yambio: 4 acres for propagation.

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## SHAMBAT STATION

BY

R. L. KNIGHT, S. O. S. DARK AND R. L. CUANY.

### Introduction.

It has been the practice over the last few seasons for the Shambat Report to be divided into two sections: Economic Genetics and Cytogenetics. The resignation of Dr. Douwes followed by the death of Mr. Sadd in August 1952 and the recruitment of Dr. Dark have made it impossible, if indeed it was ever desirable, to separate the work of the Station in this way. For this reason the present report is written as a single cohesive unit and it is intended to continue in this way.

### Meteorology.

There was no effective precipitation until August, and by mid September the rains were over. Total rainfall for the season was 6·99 inches. Summer temperatures were normal but the winter was

abnormally warm so that conditions were excellent for out-of-season crops. The monthly mean maximum ranged from 111·3° F. in May 1952 to 94·3° F. in January 1953, with a mean maximum of 101·2° for the year.

## Genetics.

*Production of 'Egyptian' varieties resistant to blackarm and leafcurl. Domains Sakel derivatives.*

*BLR14/25.2* ($B_2$ $B_3$ + leafcurl resistance).—Roguing for leafcurl was continued in the two acre plot of BLR14/25.1 sown in March 1952 (see last season's report, p. 10), and by mid September 1952, when the first bolls were open, 2,571 infected plants had been removed leaving 5,951 healthy plants. It had been hoped that a much higher rate of infection than this 30% would be obtained, but at no time was the whitefly (*Bemisia*) population adequate for rapid spread of the disease.

Natural seed from these 5,951 healthy plants was used to sow an 18 acre increase area in October 1952 under the number BLR14/25.2 and from this was produced enough seed to sow 250 acres in the Gash next season and to enable the type to be included in all of next season's Gezira varietal trials.

Seed of BLR14/25.2 was sent to Medani for sowing in late September. The whitefly population was abnormally high in the Gezira and the whole plot rapidly showed 100% leafcurl. This result was disappointing, though only very high resistance could have withstood the effect of late sowing coupled with such a severe 'bombardment' by infected whitefly. In this plot 500 plants were selected by Shambat staff trained in grading for leafcurl resistance. These plants showed milder symptoms than those found on Sakel. Self-bred seed of these 500 plants was sown on 1½ acres at Shambat on 28th March 1953. To make sure of obtaining an adequate whitefly population the cotton was intersown with *lubia* (*Dolichos*) and 243 leafcurl ratoons were successfully transplanted in the plot. Immediately alongside this 1½ acre plot, 466 leafcurl plants were growing, and these and the ratoons were left until an adequate leafcurl attack had started in the newly sown plot. After heavy leafcurl roguing this material will be bulked as BLR14/25.3.

The following results, based on two replicates with 300-350 plants, show that progress towards leafcurl resistance is being made but that it is slower than might have been expected from the results obtained in breeding BLR14/16 from BAR14/7 (1948-1949 Report p. 62). This slower response of BLR14/25 to selection probably indicates insufficient variability in the stock, owing to its having originally been bulked from many fewer plants than was BAR14/7.

LEAFCURL GRADING OF BLR14/25.2, BLJR14/29 AND DOMAINS SAKEL (PERCENTAGES)

| | *Leafcurl grade* | | | | | |
|---|---|---|---|---|---|---|
| | '0' | '1' | '2' | '3' | '4' | Total |
| D.S.[4] | 32·8 | 29·4 | 25·2 | 10·4 | 2·2 | 100·0 |
| BLR14/25.2 | 56·5 | 18·9 | 21·1 | 2·5 | 1·1 | 100·1 |
| BLJR14/29 | 57·9 | 13·6 | 22·7 | 4·5 | 1·2 | 99·9 |

*Other blackarm resistance transferences to Sakel and X1730.*

Transferences of the *arboreum* intensifying gene $B_{6m}$ to BAR4/16 and BAR5/6 were continued and now await only the production, at Medani Station, of 'filters' of BAR4/16 and BAR5/6 to which final backcrosses can be made before selfing out.

Transference of $B_{6m}$ to BLR14/25 derivatives has reached a stage where a final type can be selfed out next season. In addition, seed was produced from which homozygous $B_2$ $B_{6m}$ Sakel and X1730 types can be bulked next season.

The gene $B_5$ was selfed out from the sixth backcrosses to Sakel and to X1730, and homozygous types will be propagated next season. The Stoneville 20 gene, $B_7$, and the *herbaceum* resistance genes from Wagad 8 were taken to the sixth Sakel backcross stage and seventh backcross seed was obtained. Check crosses were made between Sakel carrying a *herbaceum* B gene and the other known resistance genes.

A recessive blackarm resistance gene from *G. anomalum* was taken to the third backcross to a susceptible *arboreum*.

In checking the homology of transferred Asiatic genes (1950-51 Report, p. 41), the $F_1$ was made this season between $B_4$ $B_4$ Sakel obtained from an earlier auto-allotetroploid transference from *arboreum* and $B_4$ $B_4$ Sakel from a similar later transference. $F_2$ results next season will show whether in this later transference the Asiatic gene has again gone to the same locus in the AD genom.

*Production of blackarm resistant strains of American Upland.*

*Transferences involving $B_{6m}$.*—The transference of the *arboreum* blackarm resistance intensifier, $B_{6m}$, from synthesized Sakels to Uganda BP52 derivatives carrying $B_2$, was continued. Transferences of $B_{6m}$ to BAR11/7, BAR7/8.1, BAR NT96.1, BAR10/3, and BAR20/1 were initiated, as was a transference of $B_2$ + $B_{6m}$ to Wilds SUS16/1. The objectives in these lines of work are:—

(1) BAR11/7 (XA129 + $B_2$ + $B_3$) is intended for Equatoria, where its congener BAR11/5 ($B_2$ only) has done well; the addition of $B_{6m}$ to this $B_2$ $B_3$ material should give a valuable type for high rainfall areas carrying field immunity to blackarm.

(2) BAR7/8.1 is a BAR SP84 carrying $B_2$ and $B_3$; it is being expanded to 3,000 acres on the Abu Habl with a view to using it throughout the Nuba Mountains and Central Rainlands. The addition of

$B_{6m}$ to this strain will give adequate insurance against blackarm even under optimum conditions of spread.

(3) BAR NT96.1 represents a possible alternative to the BAR SP84 type for the rainlands, but its blackarm resistance ($B_2$ only) is inadequate for the requirements of the area: the addition of $B_{6m}$ may make it into a really valuable strain of distinctly better quality than the BAR SP84 group.

(4) BAR10/3 (Deltapine + $B_2$) and BAR20/1 (a cluster variety of BAR NT96) may prove valuable for mechanical harvesting in the rainlands but both will need $B_{6m}$ as an added insurance against blackarm.

*BAR7/8.1* ($B_2$ $B_3$ BAR SP84).—The 12 acre propagation plot of BAR7/8.1 sown in March 1952 at Shambat (1951-2 Report, p. 11) yielded 3,000 lb. of seed and this was used in sowing a 240 acre increase area at Semeiha on the Abu Habl Scheme.

*BAR7/8.2.*—The 194 plants selected in BAR7/8.1 at Shambat (1951-2 Report, p. 11) were grown in progeny rows against controls at Kadugli, this season. Seed cotton from these progenies was sent to Medani Station for filtering and the selfbred seed of the final selections was bulked and sown at Shambat on two acres in March 1953 under the number BAR7/8.2.

*BAR11/7* (XA129 + $B_2$ + $B_3$).—A small isolated propagation plot of this variety was grown but it suffered an extremely heavy bollworm attack. Enough seed was produced, however, to sow a quarter-acre isolated plot at Wadi Seidna in February 1953.

*Wilds Selected Early Strain* (SUS 16/1).—In transferring $B_2$ to this variety the sixth backcross to SUS 16/1 was grown in isolation to produce seed for a large $F_2$ from which homozygous lines can be selfed out.

*Jassid resistance.*

In the transference of MU8b hairiness to Sakel a generation was lost owing to the almost complete failure of the 1951-2 winter crop. The fifth backcross $F_1$ generation was grown again at normal crop time and adequate seed was produced for the $F_2$ progenies next season.

The transference of hairiness from Philippines Ferguson to Sakel was also handicapped by the poor 1951-2 winter crop. Seventh backcross $F_1$ material was grown successfully in 1952-3 winter. The Ferguson basic hair gene has been shown to be allelic to $H_1$ and has been given the symbol $H_1^k$. It appears to be unbreakably linked with $chl_1$, one of the two genes which together control chlorophyll deficiency. To remove this difficulty the Ferguson minor hairiness gene complex has been switched to $H_1$ of Tanguis origin by repeated backcrossing (followed in each generation by selfing) to blackarm resistant Sakel homozygous for $H_1$. The marked sterility encountered

in the earlier generations has now been completely eliminated and completely fertile lines of Sakel type, but carrying the full Ferguson hairiness, have been obtained. Further backcrossing will be necessary since the lint is not yet of Sakel quality.

The basic hairiness gene transferred from Wagad 8 (*G. herbaceum*) to Sakel was shown to be identical with $H_1$: this proves that $H_1$ (and by inference $chl_1$) belong in the A portion of the AD genom.

Work with hairiness genes from *G. arboreum, G. mustelinum,* St. Ignatius (*marie-galante*) and Hairy Giza 36 was continued, as was work on the transference of jassid resistance to Wilds SUS 16/1.

All investigations of the genetics of jassid resistance have so far located only one commercially valuable major hairiness gene —$H_1$. For this reason 'synthetic' $H_1$ Sakels have been used as ultimate backcross parents in all the transference lines under investigation. Spinning tests are now available on BLJR14/23—the backcross parent which was used almost exclusively last season and which carries $H_1$ + $B_2$ + leafcurl resistance. These tests show that $H_1$ from Tanguis plus $B_2$ from American Upland can be added to Sakel without any adverse effect on quality.

Extract from Shirley Institute S.S.S.T. Report No. *282.*

| | *Effective length (32nds)* | *% Short fibre* | *Standard fibre wt.* | *Count × strength (80's)* | *Yarn appearance* |
|---|---|---|---|---|---|
| BLJR14/23 | 46 | 34 | 151 | 2060 | 5 |
| D.S. control | 45 | 36 | 150 | 2083 | 5 |

*Yield.*

The transference of increased number of locules from tetraploid *arboreum* (*sanguineum*) to Sakel was discontinued because no major gene was present. Since the *arboreum* parent had only a moderate proportion of 4-loculed bolls this was not unexpected. Transferences from tetraploid *herbaceum,* Philippines Ferguson, Punjab 268F and 244F, Stoneville 20, Pubescent T611 and Clevewilt were continued.

The transference of 4-loculed bolls from Ferguson to Sakel reached the sixth backcross stage and seventh backcross seed was produced for sowing next season. This last cross was made to BLR14/25.1. One more cross to a BLR14/25 derivative will be required before a 4-loculed strain can be selfed out.

The transference of an increased number of ovules per locule from *G. auritum* to blackarm resistant Sakel was continued.

*Exploitation of wild Gossypium species.*

*G. thurberi.*—Work on the transference of high lint strength to Sakel was continued, but no success has yet been achieved in obtaining a Sakel line homozygous for this character.

*G. anomalum.*—This season a pentaploid progeny of 18 plants was grown. It was obtained by crossing *G. 'anomadense'* (1951-2 Report, p. 12) with BLR14/25. Using the pentaploids as female parents and pollinating with BLR14/25.1 pollen, 218 backcross seeds were obtained for sowing next season. The objectives in this line of work are threefold: (1) Transference of narrow bracts from *anomalum* to Sakel to reduce trash in picking. (2) To see whether lint quality genes can be transferred from *anomalum*. (3) To pick up any major hairiness genes present in *anomalum* for inclusion in the jassid resistance programme.

*Other species.*—Crosses have been made between New World cottons and the following wild species: *G. robinsonii, G. sturtii, G. somalense, G. gossypioides, G. klotzschianum, G. klotzschianum* var. *davidsonii,* and *G. raimondii.* It is intended to treat the hybrid seed with colchicine with a view to making hexaploids for use as donor parents in transference work. The following hexaploids have already been made at Shambat: *G. 'armadense', G. 'anomadense', G. 'thurbadense',* and in addition *G. 'anomutum', G. 'sturtutum', G. 'harknutum', G. 'thurbutum', G. 'raimutum', G. 'herbasutum'* and *G. 'stocksutum'* have been obtained through the courtesy of Dr. Richmond of College Station, Texas, and of Dr. Meyer of Stoneville, Miss.

All these American hexaploid accessions have been successfully crossed with BLR14/25.2.

*Bollworm resistance.*

Work on transferring bollworm resistance from *G. thurberi* and *G. armourianum* to New World cottons was started at Shambat in 1944 (1944-5 Report, pp. 55-6) but was discontinued at the end of the 1947-8 season owing to lack of laboratory accommodation at Shambat. This season this research was re-started, using seed from the 1947-8 breeding plots.

The following groups of progenies were grown:

6 progenies of *G. 'armadense'* × D.S$^2$ $F_2$
7 „ „ *G. 'armadense'* × D.S$^3$ $F_2$
5 „ „ (*G. 'thurbadense'* × D.S.) × XA129$^2$$F_1$
5 „ „ (*G. 'thurbadense'* × D.S.) × XA129 × BAR14/7 $F_1$

Of these progenies, 21 were grown for bollworm resistance and two, both *G. armadense* hybrids, and both glabrous, for jassid resistance and whitefly resistance (cf. 1947-8 Report, p. 61).

A number of plants which appeared to have good bollworm resistance were selected within these progenies. Some of these were backcrossed to BLR14/25.2, some to BAR11/7 and some were selfed. Material carrying jassid and whitefly resistance was also selected.

*Earliness.*

Work on the transference of earliness from *G. arboreum* and *G. herbaceum* to Sakel was continued.

*Breeding techniques with polyploids.*

*Colchicine treatment.*—Various treatments of the buds of young seedling plants with colchicine were tried, but none was found to be superior to seed treatment for the production of plants with doubled chromosome number.

*Hormone treatment.*—Experiments with an abscission suppressing hormone kindly supplied by Prof. Wain of Wye College, University of London, have shown that bolls can be kept on a sterile triploid plant for 2 months until they are mature, even though the contained seeds are hollow (in contrast to their being naturally shed within a week). This technique may be valuable in making difficult crosses, enabling weak embryos to mature in the retained bolls.

*Wild species.*

*G. aridum.*—The new stock from Pericos, Mexico, has produced the first flowers of this species to be seen in Shambat. Unfortunately, they appeared at the beginning of the hot season and are shedding.

*G. robinsonii* × *G. sturtii.*—From the hybrid a small $F_2$ family is now showing segregation of leaf characters but the plants are as yet only juvenile. A backcross of the hybrid to *G. sturtii* has begun to flower. The appearance of these families indicates that the two "species" must be very closely related.

*Type collection.*

The *herbaceum* and *arboreum* sections were grown at Medani this year, but an effective survey of the types was impracticable.

*Checking the locus of transferred $R_2$ genes.*

$F_2$ families totalling 1,809 plants have given no 'crossover' plants which would have resulted if the $R_2$ gene had entered a slightly different locus on the Sakel chromosome when the two original transferences were made.

*Asiatic linkage.*

The building up of tester stocks is being continued.

## Diseases and Pests.

Shambat suffered an outstandingly heavy attack of both pink and Egyptian bollworm this season. This had one advantage in that it made for confidence in the selection of bollworm resistant material.

# KADUGLI STATION

BY

M. F. ROSE AND HASSAN EFFENDI OMER EL BAHARI.

## Meteorology.

Late rains, light and badly distributed, were chiefly responsible for the failure of the Nuba Mountains crop to reach the 1951/52 season's record. A record seed issue was expected to yield a crop of a million small kantars (99 lb.) seed cotton but final returns were 608,385. The crop generally was late planted and with the early closing down of the rains had little chance to recover from the bad effects of a very short season. Coupled with this, flea beetle and Sudan bollworm took their toll and at the end of the season much seed cotton was left on the ground owing to lack of pickers. Rainfall figures for the area are shown in Table 7 and temperature for Kadugli in Table 8.

Table 7.

Rainfall mm.

| *Station* | *April* | *May* | *June* | *July* | *Aug.* | *Sept.* | *Oct.* | *Nov.* | *Total* |
|---|---|---|---|---|---|---|---|---|---|
| Kadugli 1951 | — | 204·7 | 80·0 | 169·6 | 103·9 | 146·3 | 120·9 | — | 825·4 |
| Kadugli 1952 | 4·0 | 40·5 | 78·8 | 148·6 | 129·0 | 41·9 | 87·2 | — | 530·0 |
| Dilling | — | 25·0 | 72·5 | 62·5 | 182·0 | 201·5 | 72·0 | — | 615·5 |
| Lagowa | — | 32·0 | 92·5 | 154·5 | 199·5 | 100·5 | 57·3 | — | 636·3 |
| Talodi | — | 47·0 | 68·5 | 171·0 | 266·0 | 88·5 | 94·5 | — | 735·5 |
| Kalogi | — | 47·0 | 59·0 | 81·0 | 280·0 | 95·0 | 74·0 | — | 636·0 |
| Abu Gubeiha | — | 71·0 | 109·5 | 232·5 | 155·0 | 112·0 | 43·0 | — | 723·0 |
| Um Berembeita | — | 20·7 | 82·2 | 171·2 | 282·0 | 85·1 | 35·0 | — | 676·2 |
| Abbassiya | — | 18·5 | 99·5 | 120·5 | 383·0 | 38·0 | 59·0 | — | 718·5 |

Table 8.

Temperature °F. at Kadugli.

| | *Mean Max.* | *Range* | *Mean Min.* | *Range* |
|---|---|---|---|---|
| Resting Period Dec. 1951—May 1952 | 100 | 104-89 | 68 | 77-59 |
| Growth Period June 1952—Nov. 1952 | 92 | 95-84 | 70 | 73-64 |

## Cotton Breeding.

The breeding plot was sown on 22nd July, very late in the season for experimental material. The date was determined by the cessation of the light, chancy rains which had made earlier planting very risky. 194 progeny rows of BAR7/8.1, deriving from parents selected at Shambat, were spaced at 90 cms. × 90 cms., each progeny row with its appropriate control. Germination was good but hand watering was necessary to maintain growth during a dry spell. Selfing on all progeny rows commenced at the end of September. Final stands were good and picking commenced on 13th November. 20th December marked the final pick and all the material, both selfed and natural

TABLE 9.
YIELD OF SEED COTTON AND LINT IN LB. PER ACRE.

| | *Hebeila* | | | *Talodi* | | | *Lagowa* | | | *Kadugli* | | | *Overall Mean* | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Seed Cotton* | *Lint* | *G.O.T.* | *Seed Cotton* | *Lint* | *G.O.T.* | *Seed Cotton* | *Lint* | *G.O.T.* | *Seed Cotton* | *Lint* | *G.O.T.* | *Seed Cotton* | *Lint* | *G.O.T.* |
| BAR 7/8.1 | 680 | 232 | 34·1 | 681 | 230 | 33·8 | 697 | 238 | 34·2 | 1360 | 470 | 34·6 | 855 | 293 | 34·2 |
| BAR 7/8 | 787 | 265 | 33·6 | 724 | 242 | 33·5 | 704 | 241 | 34·2 | 1210 | 404 | 33·4 | 856 | 288 | 33·7 |
| BAR 7/3 | 698 | 232 | 33·2 | 589 | 189 | 32·1 | 636 | 211 | 33·2 | 974 | 309 | 31·7 | 724 | 235 | 32·6 |
| BAR SP 84 | 629 | 195 | 31·1 | 622 | 187 | 30·1 | 636 | 196 | 30·9 | 1034 | 310 | 29·9 | 730 | 222 | 30·5 |
| Pump Scheme | 665 | 200 | 30·1 | 594 | 167 | 28·2 | 626 | 187 | 29·9 | 963· | 278 | 28·9 | 712 | 208 | 29·3 |
| SE (mean) | 17·6 | | | 11·5 | | | 11·1 | | | 16·6 | | | | | |
| Difference P = 0·05 | 51 | | | 33 | | | 32 | | | 48 | | | | | |

TABLE 11.
SUMMARY OF SPINNING TEST REPORTS ON CURRENT NUBA MOUNTAINS STRAINS UP TO AND INCLUDING 1951-52.

| *Variety* | *Effective Length 32's* | | | *Standard Hair Weight* | | | *Corrected Lea Count × Strength Product* | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *No. of Trials* | *Mean* | | *No. of Trials* | *Mean* | | *No. of Trials* | *Means of 32's cts.* | | *No. of Trials* | *Means of 40's cts.* | | *No. of Trials* | *Means of 50's cts.* | |
| | | *Variety* | *PSS* | | *Variety* | *PSS* | | *Variety* | *PSS* | | *Variety* | *PSS* | | *Variety* | *PSS* |
| BAR SP 84 | 17 | 39 | 37 | 17 | 194 | 193 | — | — | — | 17 | 2158 | 2202 | 11 | 1968 | 2040 |
| BAR NT 96/40 | 9 | 38 | 37 | 9 | 201 | 194 | — | — | — | 9 | 2113 | 2178 | 4 | 1995 | 2066 |
| | | *Variety* | *BAR SP 84* | | *Variety* | *BAR SP 84* | | *Variety* | *BAR SP 84* | | *Variety* | *BAR SP 84* | | *Variety* | *BAR SP 84* |
| PSS | 17 | 37 | 39 | 17 | 193 | 194 | — | — | — | 17 | 2202 | 2158 | 11 | 2040 | 1968 |
| BAR NT 96/40 | 11 | 37 | 38 | 11 | 199 | 190 | 1 | 2053 | 2023 | 11 | 2089 | 2150 | 4 | 1983 | 2006 |
| BAR 7/3 | 5 | 37 | 37 | 5 | 193 | 187 | 1 | 2179 | 2023 | 5 | 2004 | 2018 | 1 | 2020 | 2142 |
| BAR 7/8 | 6 | 35 | 38 | 6 | 188 | 190 | 1 | 1937 | 2023 | 9 | 1934 | 2176 | 1 | 2016 | 2142 |

seed cotton with controls, was sent to Medani for analysis. All lots were examined in terms of yield per plant, length, strength, fineness of lint and maturity. Thirty-three passed the necessary standards, of which 10 were marked down as having lint of markedly superior quality. All selfed lots were bulked giving the new nucleus BAR7/8.2. Bulked natural seed of these 33 progeny rows will appear in the Nuba Mountains variety trials in the coming season while the 10 progeny rows showing superior lint quality will be grown in small isolated plots on the Kamina Farm for small scale spinning tests.

### Cotton Variety Trials.

Except for the north-east Jebels where adequate facilities are not available for the conducting of field experiments, the Nuba Mountains crop is covered by the four trials at Habeila (North), Talodi (South), Lagowa (West) and Kadugli (Centre). These trials were planted on 8th, 13th, 2nd and 22nd July respectively. The layout was standard: randomized blocks of 5 varieties × 8 replications of plot size 0·028 feddans with spacing 90 × 100 cms. Figures from these trials are shown in Table 9.

In terms of lint per acre, BAR 7/8 material ($B_2$ $B_3$) has significantly outyielded BAR SP84 ($B_2$) and Pump Scheme Strain ($b_2$) at all sites. At Kadugli BAR 7/8.1 showed its potential by out-yielding BAR SP84 by 52% and Pump Scheme by 69%. Over all four trials this increase

Table 10.

Summary of Performance of Current Strains in Kordofan Variety Trials up to and including Season 1952-53.

| *Variety* | *Seed Cotton (lb./acre)* | | | | *Lint (lb./acre)* | | | |
|---|---|---|---|---|---|---|---|---|
| | *No. of Trials* | *Variety* | *PSS* | *Variety as % of PSS* | *Trials* | *Variety* | *PSS* | *Variety as % of PSS* |
| PSS | 63 | 950 | 976 | 100 | 54 | | | |
| BAR SP 84 | 20 | 935 | 950 | 96 | 20 | 275 | 275 | 100 |
| | | | | | | 303 | 287 | 105 |

| *Variety* | *Seed Cotton (lb./acre)* | | | | *Lint (lb./acre)* | | | |
|---|---|---|---|---|---|---|---|---|
| | *No. of Trials* | *Variety* | *BAR SP 84* | *Variety as % of BAR SP 84* | *No. of Trials* | *Variety* | *BAR SP 84* | *Variety as % of BAR SP 84* |
| BAR SP 84 | 24 | 1056 | 1056 | 100 | 24 | 340 | 340 | 100 |
| BAR 7/8 | 9 | 1109 | 1033 | 107 | 9 | 379 | 324 | 117 |
| BAR 7/8.1 | 4 | 855 | 730 | 117 | 4 | 293 | 222 | 132 |
| BAR 7/3 | 8 | 1021 | 1051 | 97 | 8 | 333 | 328 | 102 |

was 32% and 41% respectively. These marked increases can be ascribed not only to a very high resistance to blackarm but to a robust plant habit which stood the type in good stead during a difficult season. A summary of performance of current strains in Kordofan variety trials (up to and including season 1952/53) and spinning test figures (up to and including season 1951/52) are shown in Tables 10 and 11.

### Cotton Propagation.

A two acre plot of BAR NT96.1 was grown in isolation at El Effein. The season was responsible for the very low yield of 450 lb. of seed cotton per acre. The gene transference of $B_{6m}$ to this type, already carrying $B_2$, will be made at Shambat in the 1953/54 season.

240 acres of BAR 7/8.1 were grown at Semeiha (under 'ponding' conditions) and averaged 417 lb. of clean seed cotton per acre. This seed will be available to plant an area of over 3,000 acres in the same locality in the 1953/54 season.

### Pests and Disease.

American, pink and especially Sudan bollworm did considerable damage to the crop; flea beetle damage in the early stages was severe. Blackarm was general throughout the crop but BAR 7/8 and BAR 7/8.1 showed marked resistance.

### Other Crops.

Dura and cowpeas appeared in the standard rotation while simsim and groundnuts were grown in small propagation plots. All yields were well below average owing to the scanty rainfall.

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### Appendix.

### Key to Symbols Used in this Report.

*Egyptian. S types.*

| | |
|---|---|
| DS | Domains Sakel originally imported from Egypt. |
| BLR 14/16 | BAR 14/7 ($B_2$) re-selected for leafcurl. |
| BLR 14/16.1 | 1st filter. |
| BLR 14/25 | A Sakel type carrying $B_2$ and $B_3$ with fair leafcurl resistance. |
| BLR 14/25.1 | 1st filter. |
| BLR 14/25.2 | 2nd filter. |
| BLR 14/25.3 | 3rd filter (for increased leafcurl resistance). |
| BLJR 14/23 | A leafcurl resistant Sakel, blackarm resistant ($B_2$) and homozygous for $H_1$ (hairiness). |
| BLJR 14/29 | A leafcurl resistant Sakel, homozygous for $B_2$, $B_3$, $H_1$. |
| Hairy Giza 36 | Hairy *barbadense* type: direct import from Egypt. |

*Egyptian. L types.*

| | |
|---|---|
| X1730A or XA | Successor type to X1730. |
| XAG | X1730A. Gash grown. |
| XAT | X1730A. Tokar grown. |
| XAT.1 | 1st filter of XAT. |
| BAR 1730L or BAR XL or XL | 7th backcross X1730A, homozygous for $B_2$. |
| BAR 1730L.1 or BAR XL.1 or XL.1 | 1st filter of BAR 1730L. |
| BAR 1730L.3 or BAR XL.3 or XL.3 | 3rd filter of BAR 1730L. |
| BAR 4/16 | An X1730A type carrying both $B_2$ and $B_3$. |
| BAR 4/16.1 | 1st filter. |
| BAR 5/6 | An X1730A type carrying $B_2$, $B_3$ and the red *arboreum* pigment gene $R_2^{RS}$ |

*American Upland.*

| | |
|---|---|
| B 31 | A blackarm resistant Upland type from Uganda. |
| BAR SP84 | The blackarm resistant component of Uganda SP84. |
| BAR SP84.1 and 2 | 1st and 2nd filters. |
| BAR 7/3 | A selection from BAR SP84 for improved G.O.T. |
| BAR 7/8 | BAR SP84 carrying $B_2$ and $B_3$. |
| BAR 7/8.1 and 2 | 1st and 2nd filters. |
| BAR NT96 | A single plant selection from the cross '57 × Over-the-Top' (carrying $B_2$). |
| BAR NT96.1 | 1st filter. |
| BAR 20/1 | BAR NT96 'cluster' type carrying $B_2$. |
| BAR 12/3 | 5th backcross BP52, homozygous for $B_2$. |
| BAR 12/9 | From C(48)4 Namulonge BP52 stock made homozygous for $B_2$. |
| BAR 12/9.1, 2 and 3 | 1st, 2nd and 3rd filters of BAR 12/9 for increased blackarm resistance. |
| Pump Scheme Strain (PSS) | An old commercial bulk deriving from Nysaland Upland. |
| XA129 | A single plant selection from PSS. |
| BAR 11/5 | XA129 homozygous for $B_3$. |
| BAR 11/6 | XA129 homozygous for $B_2$. |
| BAR 11/7 | XA129 homozygous for $B_2$ and $B_3$. |
| BAR 10/1 and BAR 10/3 | Deltapine types carrying $B_2$. |
| MU8b | A Malwa Upland type (from India). |
| Wilds SUS 16/1 | American long staple type: irrigated. |
| BAR 13/1 | 511D carrying $B_2$ and $B_3$. |
| S 47 | A direct importation from Uganda. |
| Stoneville 20 | A direct importation from Belgian Congo. |
| Ferguson | A hairy American type from the Philippines (via Trinidad). |
| St. Ignatius | A hairy *marie-galante* type. |
| Kapas Purao | A densely hairy cotton from the Phillippines via Trinidad (UA 7-47). |

*Genes.*

| | |
|---|---|
| $B_1$ | A weak dominant blackarm resistance factor from Uganda B31. |
| $B_2$ | A strong dominant blackarm resistance factor from Uganda B31. |
| $B_3$ | A partially dominant blackarm resistance factor from *G. punctatum*. |
| $B_4$ | A partially dominant blackarm resistance factor from *G. arboreum*. |
| $B_5$ | A partially dominant blackarm resistance gene from 'Grenadines White Pollen'. |
| $B_6m$ | A blackarm resistance intensifier from *G. arboreum*. |
| $B_7$ | A partially dominant blackarm resistance gene from Stoneville 20. |
| $H_1$ | A hairiness gene from Tanguis. |
| $H_2$ | A hairiness gene from *G. tomentosum*. |

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